

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI • EXAMINATION – SUMMER 2013****Subject Code: 162104****Date: 03-06-2013****Subject Name: Advanced Materials and Applications****Time: 10.30 am - 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Discuss the characteristics of Titanium and Magnesium that makes them attractive for certain engineering applications. Also give their limitations. **07**
- (b) What do you mean by alloy cast Iron? Give the composition, properties and applications of High silicon cast iron. **07**

- Q.2** (a) Explain different mechanism by which high strength and creep resistance are achieved in super alloys. Mention the properties and applications of Inconel. **07**
- (b) TRIP steel satisfying the requirements of automotive industry for good formable high strength steel. Justify and comment on it. **07**

OR

- (b) Describe important characteristics & applications of free cutting steel. Why free cutting steel contain high sulphur content? Give typical composition of a free cutting steel. **07**

- Q.3** (a) Discuss important properties and applications of martensitic stainless steel. How hardness and wear resistance is developed in martensitic stainless steels? **07**
- (b) Enlist the properties and applications of metallic glasses. Compare it with crystalline alloys. **07**

OR

- Q.3** (a) Describe the properties and applications of Austenitic stainless steel. Give the composition of 304L and 347 stainless steel. **07**
- (b) Define metallic glasses. Discuss the melt spinning technique to produce the metallic glasses. **07**

- Q.4** (a) What are Nano materials? Explain the mechanical alloying technique for nano-material production. **07**
- (b) What are smart materials? Give their advantages and limitations. Write a note on shape memory alloys. **07**

OR

- Q.4** (a) Explain the sol-gel technique for nano-material production. Give the advantages of this method. **07**

- Q.4** (b) Define Piezoelectricity and write a note on Piezoelectric materials. **07**

- Q.5** (a) Define bio-materials and bio-functionality. Describe properties and application of Co-Cr-Mo alloys as a bio-material. **07**
- (b) Classify the composites. Discuss properties & applications of metal matrix composites. **07**

OR

- Q.5** (a) Define and explain biocompatibility. Describe properties and application of Ni-Ti alloy as a useful bio-material. **07**

- (b) Define superconductivity. What are type I and type II super conductors. Describe properties and applications of superconductors. **07**